Injuries to North Carolina Children: 2004 to 2007

Injury Epidemiology and Surveillance Unit
Injury & Violence Prevention Branch
North Carolina Division of Public Health
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We wish to acknowledge the Safe Kids coordinators throughout the state of North Carolina for their dedication and commitment to childhood injury prevention.

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Introduction

Childhood injury is a serious public health problem in the United States that takes a toll on the health of children age 14 and under. Childhood injury is also associated with substantial social and economic costs to the community. According to the Centers for Disease Control and Prevention (CDC), more than 5,300 children die annually from unintentional injuries and an additional 1,300 die from intentional injuries (CDC WISQARS). Unintentional injuries are a leading cause of morbidity and mortality among children and adolescents in the United States (1).

This report presents a basic overview of unintentional injuries common in children in the state of North Carolina for the years 2004 to 2007, where data is available. Leading mechanisms of death include motor vehicle injury, suffocation, fire- and burn-related injury, drowning, and poisoning. Between 2004 and 2007 in North Carolina, motor vehicle-related injuries continued to be the leading cause of injury death and the second leading cause of injury hospitalizations. Suffocation was the second leading cause of injury death to North Carolina children under the age of 15. Falls continued to be the leading cause of hospitalization (excluding 'adverse effects' occurring in hospital settings) and ED visits for the state's children.

The burden of deaths and nonfatal injuries due to each cause are shown in this report by age group and sex. A more in-depth understanding of specific groups within this age range can help identify high risk populations and can inform the allocation of resources for research as well as programs that will effectively prevent injuries. This information will be helpful to researchers who track trends or evaluate prevention activities, as well as state and local health officials, injury advocates, and policy-makers. Lastly, the general public can use this information to identify injury prevention strategies for their communities. (1)

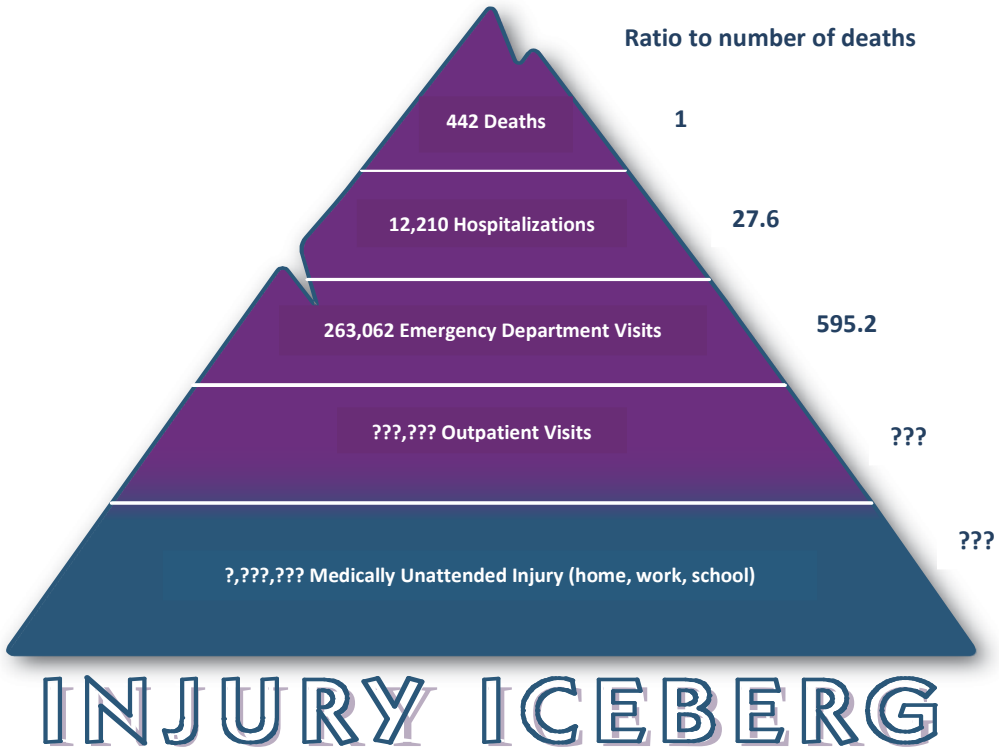
The data analyzed in this report will capture the burden of all injuries due to deaths for the years 2004-2007, hospitalizations for 2004-2007, and emergency department (ED) visits for 2006-2007. Emergency department visit data were not systematically collected before 2006, thus ED visit data used throughout this document will be limited to 2006 and 2007. Rates are used throughout this document and are per 100,000 persons unless otherwise noted. This report does not present data for injuries treated in other places, such as urgent care and private medical practices, or those that did not seek care or self-treated.

This report is an abbreviated update to the Childhood Injury Report published in 2005 (UNC IPRC) that examined childhood injuries from 1999 through 2002. In that report, North Carolina identified several childhood injury areas of concern. This report utilized a similar format, approach, and methodology; however, it is not as comprehensive in scope as the original document.

Data from injuries treated in doctors' offices, clinics, or at home are not available, so the data presented is likely to be an underestimate of the true burden of childhood injuries in the state. This report focuses on injuries with the most severe outcomes; and thus, those that represent higher societal costs in terms of health and productivity to the patients, families, and communities. Despite the limitations of the data presented, there is sufficient data to justify the implementation and evaluation of prevention programs.

The burden of injury can be better understood by looking at an injury iceberg. The injury iceberg represents the number of injuries resulting in death or treatment at various levels (Figure 1). The injuries that cause death are only the tip of the iceberg, as these injuries are the most visible to the public, but represent the smallest numbers. Non-fatal injuries are much more common. North Carolina childhood injury data between 2006 and 2007 shows that for every childhood death caused by injury, there are about 28 hospitalizations and 595 ED visits. Complete data for the rest of the injury iceberg is not available, but the two remaining categories are estimated to be far greater than the preceding categories. The missing data are from outpatient visits for injury and individuals with injuries who do not see a doctor, receive no medical care, or self-treat.

Figure 1: Injury Iceberg, N.C. Childhood Injuries: 2006-2007. Injury and Violence Prevention Branch, Chronic Disease and Injury Section, Division of Public Health.



The Problem of Childhood Injury

Between 2004 and 2007, there were 893 injury deaths (12.5 per 100,000), and 23,813 injury hospitalizations (333.3 per 100,000) among North Carolina children 14 and younger. Between 2006 and 2007, there were 263,062 ED visits (7,228.0 per 100,000).

Twenty-five percent of all deaths from childhood injuries were found among infants under one year old. Of the remaining deaths, 26.2% were among children ages one to four, 21.3% were among children ages five to nine, and 27.5% were among children ages 10 to 14. Even though the percentages for injuries in children by age group are similar, the death rates are very different. The highest death rate was observed in infants (44.5 per 100,000). The rate of death due to injury in children ages one to four was 12.0 per 100,000, in children ages five to nine was 8.2 per 100,000, and in children ages 10 to 14 was 10.4 deaths per 100,000 North Carolina residents.

The majority of childhood injuries (76.8% of injury deaths, 48.1% of injury hospitalizations, and 86.6% of emergency department visits) were due to unintentional injuries (Figures 2, 3 and 4).

Because the burden of unintentional injuries in children is greater than those of intentional injuries, the rest of this document focuses on unintentional injuries.

Figure 2: N.C. Childhood Injury Deaths by Intent, Age 0-14, 2004-2007 (n=893)

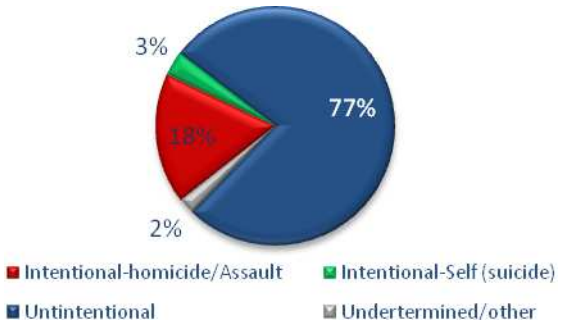


Figure 3: N.C. Childhood Injury Hospitalizations by Intent, Age 0-14, 2004-2007 (n=23,813)

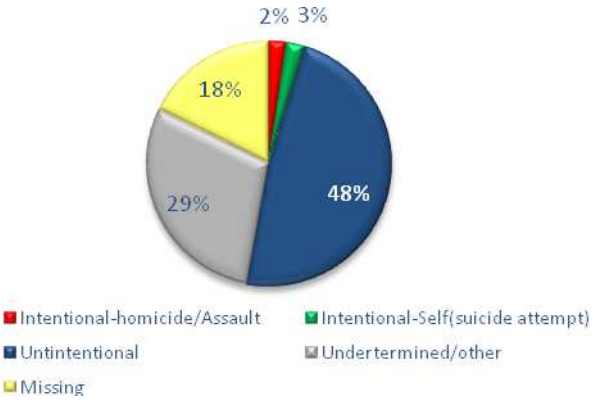
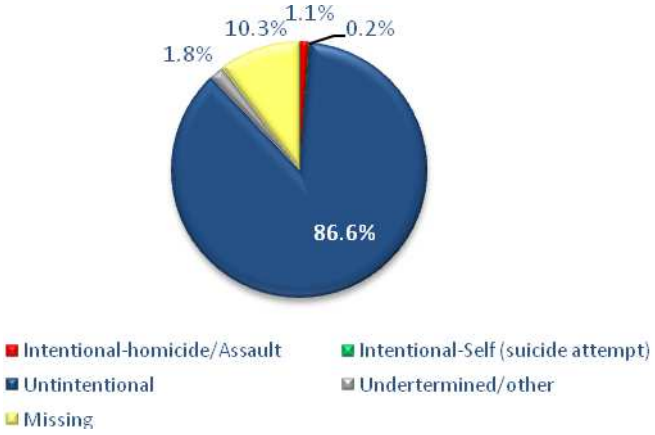


Figure 4: N.C. Childhood Injury Emergency Department Visits by Intent, Age 0-14, 2006-2007 (n=263,062)



Causes of Unintentional Childhood Injury

Between 2004 and 2007, the leading type of unintentional injury death in children ages 0-14 was motor vehicle-related, representing 44 percent of all unintentional injury deaths (Table 1). Over the same period of time, the leading type of unintentional injury that required hospital admission among children ages 0-14 was fall-related. Injuries from falls represented 25 percent of all injury-related hospitalizations (Table 2). Injuries due to falls (33 percent) were also the leading cause of injury-related ED visits in 2006 and 2007 (Table 3).

Table 1: N.C. Leading Types of Unintentional Childhood Injury Deaths, Age 0-14: 2004-2007. (n=686)

Type of Injury*	Number of Deaths
MVT	300
Suffocation	151
Fire/ Burn	68
Drowning	64
Other Land Transportation	24
Pedestrian, other	15
Poisoning	11
Fall	10
Firearm	10
Other Causes	33
Total	686

Table 2: N.C. Leading Types of Unintentional Childhood Injury Hospitalizations, Age 0-14: 2004-2007. (n=11,450)

Type of Injury*	Number of Hospitalizations
Fall	2,839
MVT	1,769
Poisoning	834
Other Spec/ Class	799
Natural Environment	754
Unspecified	750
Fire/ Burn	739
Struck	724
Other Transportation	651
Other Causes	1,591
Total	11,450

Table 3: N.C. Leading Types of Unintentional Childhood Injury Emergency Department Visits, Age 0-14: 2006-2007. (n=227,715)

Type of Injury*	Number of ED Visits
Fall	74,454
Struck	43,200
Other Spec/ Class	15,773
Natural Environment	15,606
Cut/ Pierce	15,283
MVT	13,338
Overexertion	13,242
Unspecified	13,101
Pedal Cyclist, Other	6,755
Other Causes	16,963
Total	227,715

* NOTE: CDC Injury Matrix coding was used to classify type of injury. Specific injury codes and definitions can be found in the technical notes section.

Deaths, Hospitalizations, and Emergency Department Visits by Age and Gender

Deaths, hospitalizations, and ED visits due to unintentional injuries are presented in the accompanying figures. Children under the age of one year had the highest death and hospitalization rates (32.5 per 100,000; 249.0 per 100,000 respectively). Children ages one to four had the second highest death and hospitalization rates (9.2 per 100,000; 171.3 per 100,000 children respectively). Children ages five to nine had the lowest injury rates (7.1 deaths per 100,000; 131.7 hospitalizations per 100,000). ED visits show a different pattern: children ages one to four had the highest rate (7371.9 per 100,000), while the second highest rate was seen in children ages 10 to 14 (6743.0 per 100,000), and the third highest rate was seen in children ages five to nine (5544.8 per 100,000). The age group with the lowest rate was children under age one (3055.5 per 100,000).

Boys under the age of 15 were more likely than girls of the same age to die (11.3 male deaths per 100,000 vs. 7.8 female deaths per 100,000), be hospitalized (197.1 male hospitalizations per 100,000 vs. 121.6 female hospitalizations per 100,000), or visit the ED (7,172.5 males vs. 5,296.7 females per 100,000) as a result of unintentional injury. In other words, boys were 1.4 times more likely than girls to die of an injury, 1.6 times more likely to be hospitalized, and 1.4 times more likely to visit the emergency room due to an injury (Figures 5, 6 and 7).

Figure 5: N.C. Childhood Unintentional Injury Deaths by Age and Gender, Age 0-14, 2004-2007. (n=686)

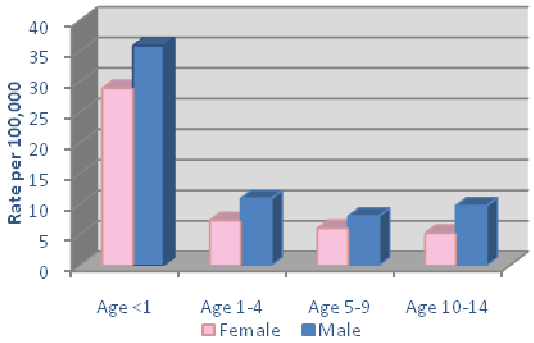


Figure 6: N.C. Childhood Unintentional Injury Hospitalizations by Age and Gender, Age 0-14, 2004-2007. (n=11,449)

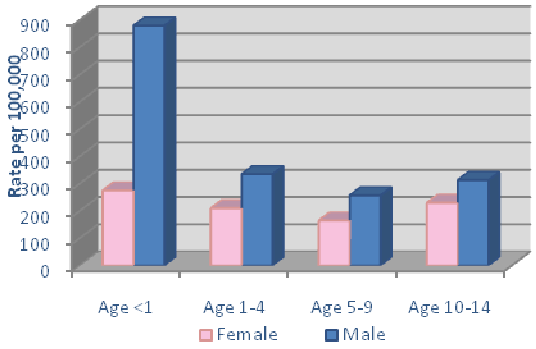
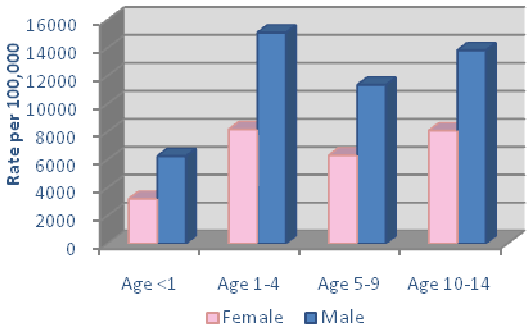


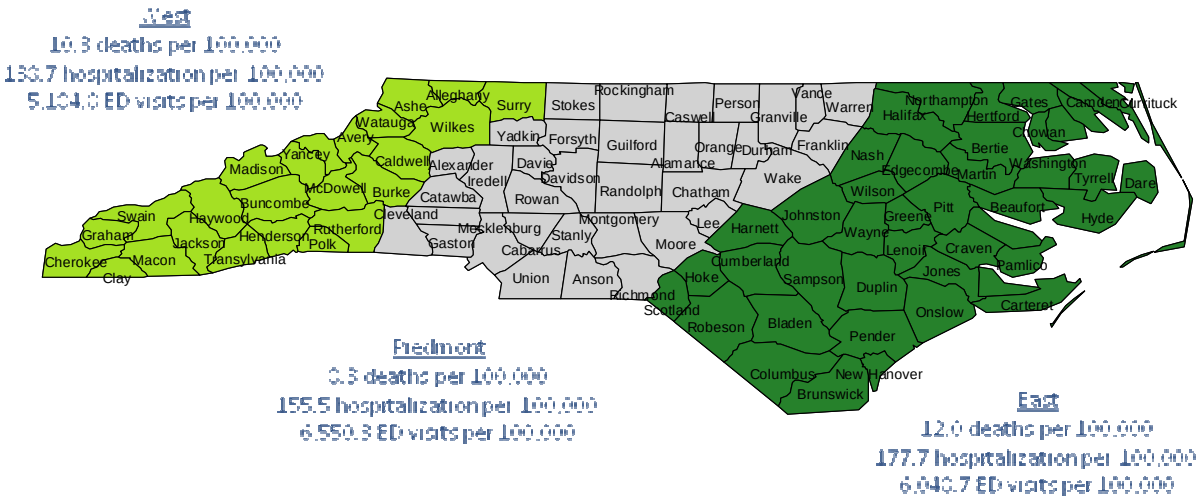
Figure 7: N.C. Unintentional Childhood Injury Emergency Department Visits by Age and Gender, Age 0-14, 2006-2007. (n=227,715)



Regional Injury Rates

The three geographic regions of North Carolina reported different rates of childhood injury deaths, hospitalizations, and emergency department visits. The Piedmont (Central) Region of the state reported the lowest mortality and second highest morbidity rates from unintentional childhood injury from 2004 to 2007 (8.3 deaths per 100,000; 155.5 hospitalizations per 100,000). The Eastern Region reported the highest mortality rate (12.0 deaths per 100,000) and the highest morbidity rate (177.7 hospitalizations per 100,000). The Western Region reported the second highest mortality rate (10.3 deaths per 100,000) and the lowest morbidity rate (138.7 hospitalizations per 100,000) (Figure 8).

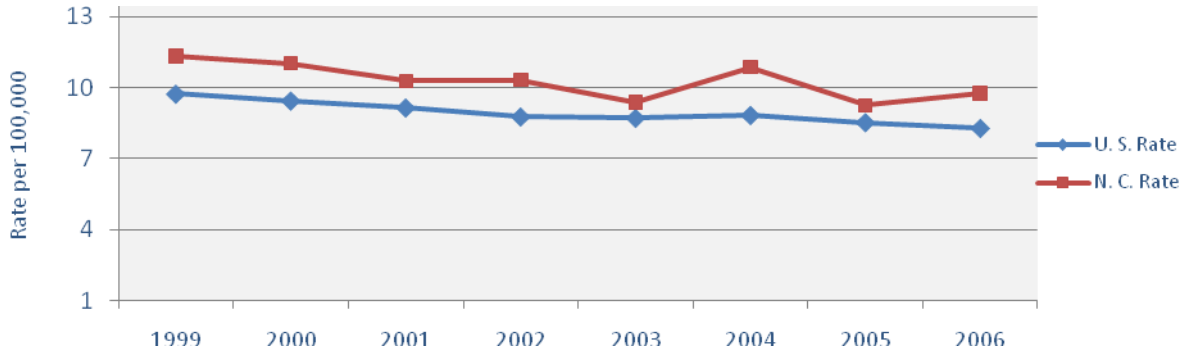
Figure 8: N.C. Unintentional Childhood Injury Death (n=686), Hospitalizations (n=11,450): 2004-2007, and Emergency Department Visits (n=227,715) Rates by Region, Age 0-14: 2006-2007.



Comparison to the United States over Time

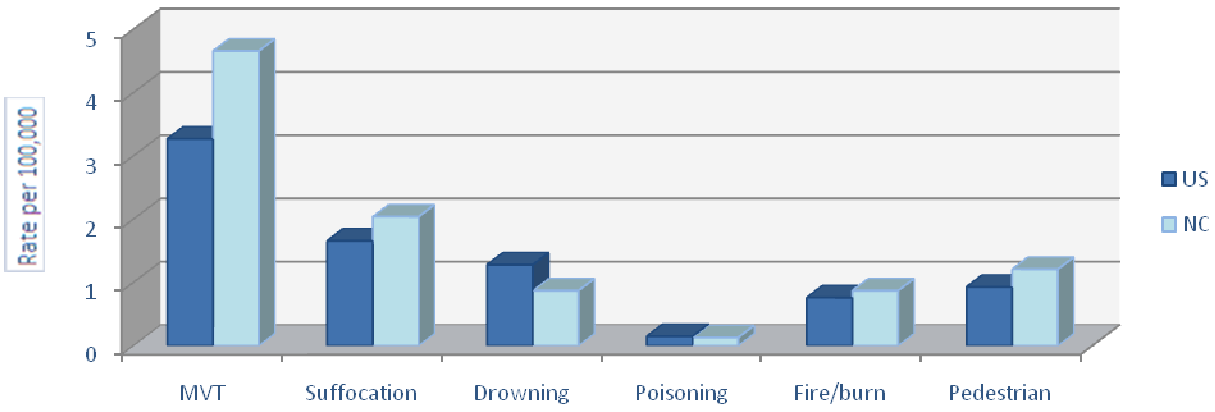
The death rates due to unintentional injuries in children under the age of 15 in North Carolina and the United States have declined slightly over time. However, the death rate due to unintentional injuries in North Carolina children has been historically higher than that for the nation. In 2006, the most recent year for which federal data are available, the national unintentional injury rate for children under 15 was 8.3 deaths per 100,000. In North Carolina, the 2006 rate was 9.8 deaths per 100,000 (Figure 9). When comparing the death rates per injury types in 2004 through 2006, the rates for motor vehicle traffic injuries (MVT) were higher in North Carolina compared to the United States (4.7 per 100,000 children in N.C.; 3.0 per 100,000 children in the U. S). (Figure 10).

Figure 9: Unintentional Childhood Injury Death Rates in North Carolina and the United States, Age 0-14: 1999-2006.



Data Source: CDC WISQARS

Figure 10: Unintentional Childhood Injury Death Rates in North Carolina and the United States by Type of Injury, Age 0-14: 2004-2006.



* NOTE: Caution, NC rates for both fire/burn and poisoning are based on a low number of deaths.

Data Source: CDC WISQARS

Hospitalization Charges for Unintentional Injuries in Children from 2004-2007

The financial burden from unintentional injuries to individuals, families and communities can be very high. In North Carolina, between 2004 and 2007, the hospital charges for unintentional injuries among children were estimated to be nearly $187 million. It is important to note that this estimate does not include such costs as work loss and quality of life loss. These indirect costs can greatly increase the monetary burden of injury.

Charges by Injury Type

Motor vehicle traffic (MVT) injuries were the most costly in terms of hospitalization charges totaling $52,450,884 between 2004 and 2007. Although falls accounted for the greatest number of hospital discharges, falls accounted for only the second highest total hospital charges—$30,141,951). Falls were followed by fire or burn related injuries totaling $16,131,138. (Figure 11).

Median Charge per Person

The median charge per person is the middle value of a set of charges—half the group are below and half the group are above this number. Median charges for hospitalizations vary greatly due to the severity of the injury. Charges may increase due to sophisticated procedures or extended hospital stays. The injuries with the highest median hospital charges were those resulting from firearms, for which the median charges in 2004-2007 were $21,414 per person, followed by motor vehicle-related injuries ($17,171) and pedestrian injuries ($14,262). Poisonings generated the lowest median charges of $3,620. (Figure 12).

Figure 11: Estimated Hospital Charges of Unintentional Injuries in North Carolina, Age 0-14: 2004-2007.

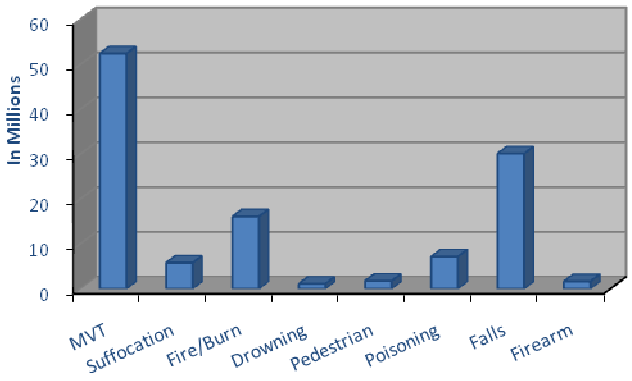
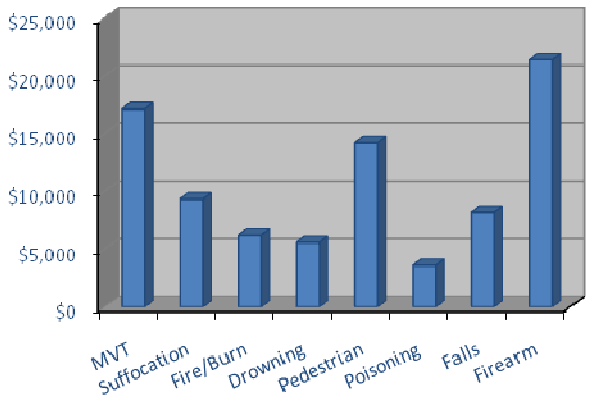


Figure 12: Median Hospital Charges of Unintentional Injury Hospitalizations in North Carolina, Age 0-14: 2004-2007.



Motor Vehicle Traffic (MVT) related Injuries

Motor vehicle crashes are among the greatest injury risk to children in North Carolina. Motor vehicle injuries are the number one cause of unintentional injury death (2004-2007), the number two cause of unintentional injury hospitalization (2004-2007), and the number six cause of ED visits (2006-2007).

From 2004 to 2007, 300 children age 14 and under were killed as a result of injuries sustained from a motor vehicle crash (4.2 per 100,000) and 1,769 children were hospitalized (24.8 per 100,000). From 2006 to 2007, 3,335 children visited the ED as a result of motor vehicle-related injury (366.4 per 100,000). Motor vehicle-related injuries are extremely expensive, accounting for higher injury charges than any other type of childhood injury. It is estimated that crash injuries between 2004 and 2007 generated more than $52.4 million in hospital charges (Table 4).

Children ages 10-14 had the highest motor vehicle crash death, hospitalization, and ED visit rates (4.9 death; 31.9 hospitalization; and 538.3 ED visits per 100,000 children). Males were more likely to die or be hospitalized due to motor vehicle crashes than females. On the other hand, females were slightly more likely to visit the ED than males as a result of a motor vehicle crash-related injury. (Figures 13, 14 and 15).

Table 4: Estimated Hospital Charges Resulting from Motor Vehicle Crash Injuries among North Carolina Children, Age 0-14: 2004-2007.

Total Charges:	$52,450,883.80
Median Charge:	$17,171.05
Average (Mean) Charge:	$29,650.02

Figure 13: N.C. Unintentional Childhood Motor Vehicle Deaths by Age and Gender, Age 0-14: 2004-2007. (n=300)

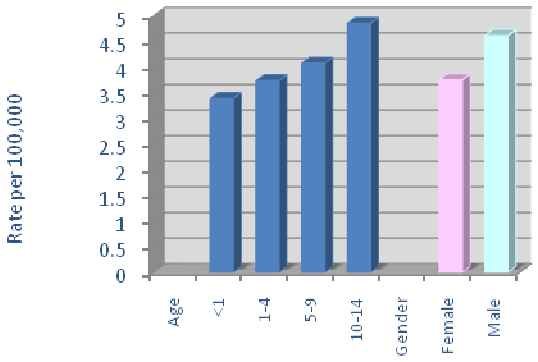


Figure 14: N.C. Unintentional Childhood Motor Vehicle Hospitalizations by Age and Gender, Age 0-14: 2004-2007. (n=1,769)

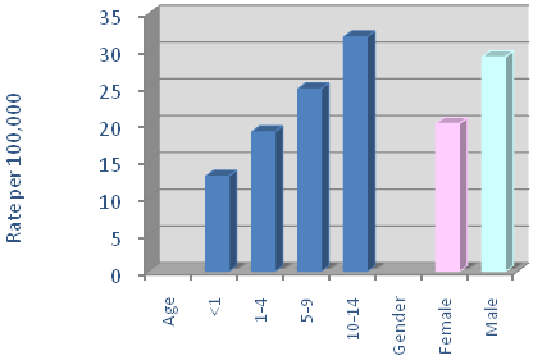
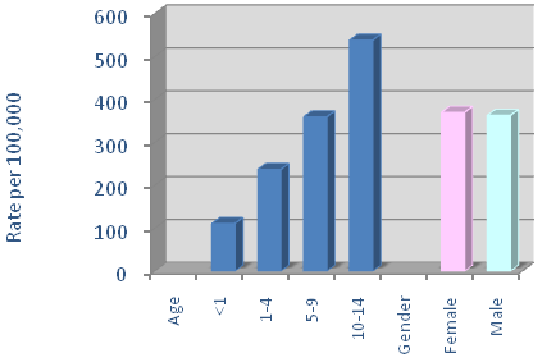


Figure 15: N. C. Unintentional Childhood Motor Vehicle Emergency Department Visits by Age and Gender, Age 0-14: 2006-2007. (n=13,335)



Suffocation And Choking

From 2004 to 2007, 151 children ages 14 and under died as a result of unintentional suffocation or choking-related injuries (2.1 children per 100,000). One hundred ninety-five children age 14 and under were hospitalized as a result of suffocation injuries (2.7 children per 100,000). From 2006 to 2007, 417 children under 15 years old visited the ED due to suffocation (11.5 children per 100,000). Suffocation injuries from 2004 to 2007 were estimated to incur $5.8 million in total hospital charges with a median charge of $9354.85. (Table 5).

Infants under the age of one were much more likely to die, be hospitalized, or visit the ED as a result of choking than other age group. Infants less than age one had death rates that were 24 to 192 times higher, hospitalization rates that were 3 to 22 times higher, and emergency department visits rates that were 1 to 15 times higher than other age groups. (Figures 16, 17 and 18).

Young children between the ages of one and four were also at an increased risk of injury. Death, hospitalization, and emergency department visit rates were 5 to 12 times higher than those for older children.

Compared to females, males were 1.4 times more likely to die (2.4 male deaths per 100,000, 1.8 female deaths per 100,000); 1.4 times more likely to be hospitalized (3.1 male hospitalizations per 100,000, 2.3 female hospitalizations per 100,000); and 1.2 times more likely to visit the ED (12.5 male visits per 100,000, 10.4 female visits per 100,000) as a result of suffocation.

Table 5: Estimated Hospital Charges Resulting from Unintentional Suffocation Injuries among North Carolina Children, Age 0-14: 2004-2007.	
Total Charges:	$5,809,360.26
Median Charge:	$9,354.85
Average (Mean) Charge:	$29,791.59

Figure 16: N.C. Unintentional Childhood Suffocation Deaths by Age and Gender, Age 0-14: 2004-2007. (n=151)

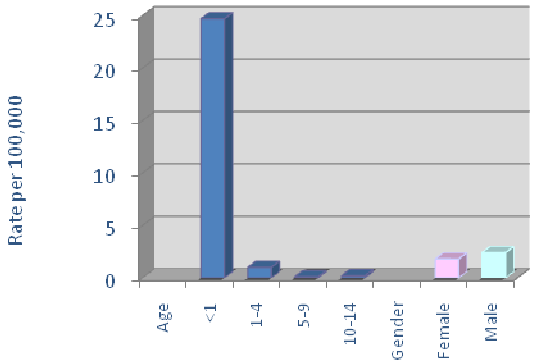


Figure 17: N.C. Unintentional Childhood Suffocation Hospitalizations by Age and Gender, Age 0-14: 2004-2007. (n=195)

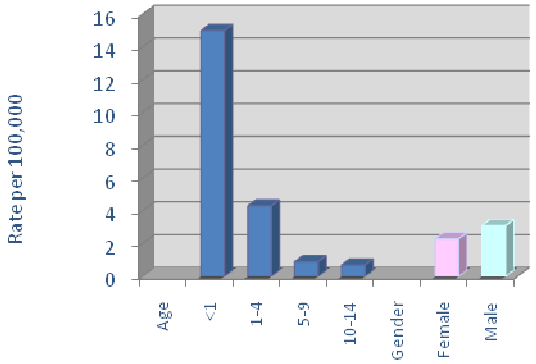
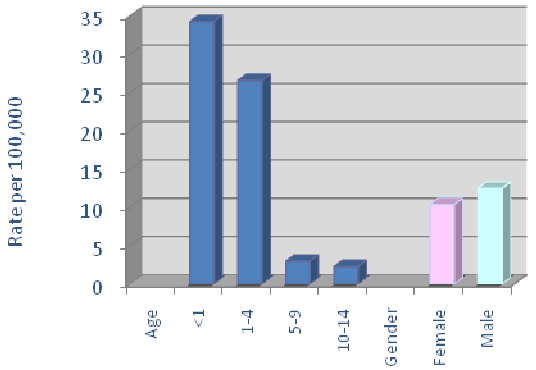


Figure 18: N.C. Unintentional Childhood Suffocation Emergency Department Visits by Age and Gender, Age 0-14: 2006-2007. (n=417)



Fire/Burn Related Injuries

From 2004 to 2007, 68 children ages 14 and under died as a result of an unintentional fire or burn-related injury (1.0 per 100,000). 739 children ages 14 and under were hospitalized as a result of fire or burn-related injury (10.3 per 100,000). From 2006 to 2007, 3,997 children were seen in an emergency department due to a fire or burn-related injury (109.8 per 100,000). Hospital charges due to fire or burn-related injuries from 2004 to 2007 are estimated at $16.1 million in hospital charges with a median charge of $6,235.34. (Table 6).

Infants under one year old are the age group with the highest death rates from fire or burn related injuries (1.6 deaths per 100,000), followed by children five to nine (1.2 deaths per 100,000). (Figure 19) The group of children age one to four accounted for the highest hospitalization rates and ED visits due to fire or burn injuries (21.9 and 217.7 per 100,000 children respectively). Children younger than five accounted for the majority of all fire and burn hospitalizations and ED visits. (Figure 20 and 21).

Males were slightly more likely than females to be injured by fire or burns (1.1 male deaths and 0.8 female deaths per 100,000; 11.5 male hospitalizations and 9.1 female hospitalizations per 100,000; and 120.6 male ED visits and 98.5 female ED visits per 100,000). (Figures 19, 20 and 21).

Table 6: Estimated Hospital Charges Resulting from Unintentional Fire/Burn Related Injuries among North Carolina Children, Age 0-14: 2004-2007.	
Total Charges:	$16,131,138.10
Median Charge:	$6,235.34
Average (Mean) Charge:	$21,828.33

Figure 19: N.C. Unintentional Childhood Fire/Burn Related Deaths by Age and Gender, Age 0-14: 2004-2007. (n=68)

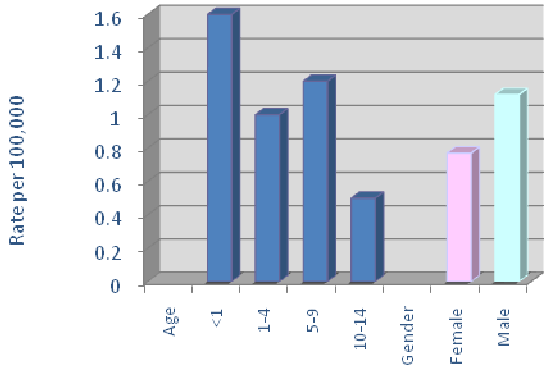


Figure 20: N.C. Unintentional Childhood Fire/Burn Related Hospitalizations by Age and Gender, Age 0-14: 2004-2007. (n=739)

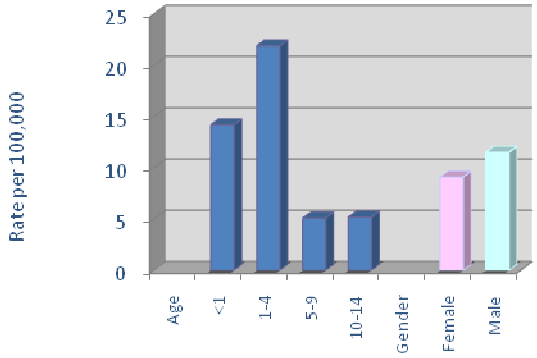
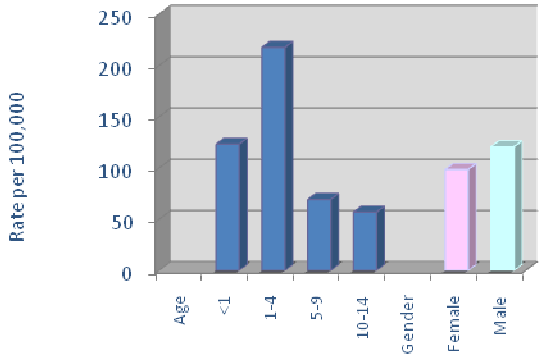


Figure 21: N.C. Unintentional Childhood Fire/Burn Related Emergency Department Visits by Age and Gender, Age 0-14: 2004-2006-2007. (n=3,997)



Drowning And Near Drowning

From 2004 to 2007, 64 North Carolina children ages 14 and under died as a result of drowning (0.9 per 100,000). Eighty-one children ages 14 and under were hospitalized as a result of near-drowning (1.1 per 100,000). From 2006 to 2007, 128 children ages 14 and under were seen in an ED as a result of a near-drowning (3.5 per 100,000). Hospital charges resulting from drowning and near-drowning injuries from 2004 to 2007 are estimated to be $1.1 million. (Table 7).

Drowning and near-drowning injuries generally affected younger children more than older children. (Figures 22, 23 and 24).

Males were 1.4 times more likely to die from drowning than females (1.0 male death rate; 0.7 female death rate). Males were 1.5 times more likely to be hospitalized from drowning than females (1.3 male hospitalization rate; 0.9 female hospitalization rate). Conversely, females were 1.2 times more likely to visit the ED (3.2 male visits; 3.8 female visits) from drowning injuries than males. Figures 22, 23 and 24 show North Carolina drowning deaths, near-drowning hospitalizations, and ED visits by age and gender.

Table 7: Estimated Hospital Charges Resulting from Near-Drowning Injuries among North Carolina Children, Age 0-14: 2004-2007.	
Total Charges:	$1,114,202.62
Median Charge:	$5,604.90
Average (Mean) Charge:	$13,755.59

Figure 22: N.C. Unintentional Childhood Drowning Related Deaths by Age and Gender, Age 0-14: 2004-2007. (n=64)

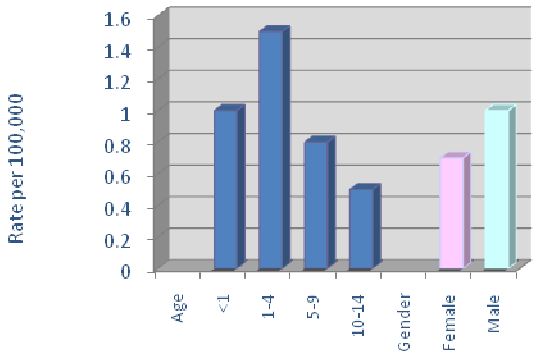


Figure 23: N.C. Unintentional Childhood Near-Drowning Hospitalizations by Age and Gender, Age 0-14: 2004-2007. (n=81)

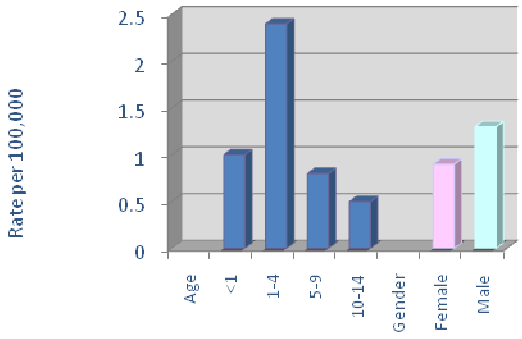
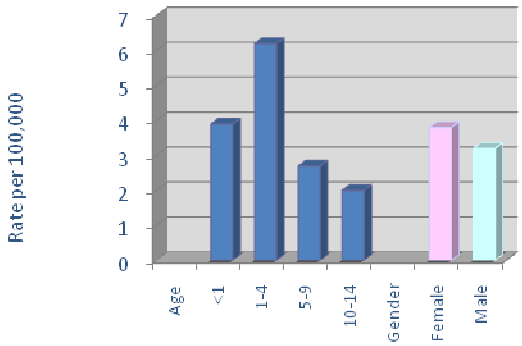


Figure 24: N.C. Unintentional Childhood Near Drowning Emergency Department Visits by Age and Gender, Age 0-14: 2006-2007. (n=128)



Pedestrian-Related Injuries (non-motor vehicle Traffic)

From 2004 to 2007, 15 children ages 14 and under died as a result of pedestrian-related injuries not involving a motor vehicle (0.2 per 100,000). Eighty-eight children ages 14 and under were hospitalized as a result of pedestrian injury (1.2 children per 100,000). Furthermore, from 2006 to 2007, 277 children in North Carolina visited the ED as a result of pedestrian-related injuries (7.6 per 100,000). Pedestrian-related injuries from 2004 to 2007 are estimated to have resulted in $1.8 million in hospital charges. (Table 8).

14 out of the 15 child pedestrians who died in North Carolina from 2004-2007 were between the ages of one and four. Hospitalization (2004-2007) and ED visit (2006-2007) rates were highest in the age group one to four (1.7 and 9.5 per 100,000 respectively). Male rates for death, hospitalization, and emergency department visits were higher than those seen in females from pedestrian injuries (0.3 male deaths per 100,000; 1.6 male hospitalizations per 100,000 and 8.9 male emergency department visits per 100,000; 0.1 female deaths per 100,000; 0.9 female hospitalizations per 100,000 and 6.3 emergency department visits per 100,000). Figures 25, 26 and 27 display the age and gender-specific pedestrian-related injury rates for North Carolina children.

Table 8: Estimated Hospital Charges Resulting from Pedestrian-related Injuries among North Carolina Children, Age 0-14: 2004-2007.	
Total Charges:	$1,758,559.19
Median Charge:	$14,262.30
Average (Mean) Charge:	$19,983.63

Figure 25: N.C. Unintentional Childhood Pedestrian Related Deaths by Age and Gender, Age 0-14: 2004-2007. (n=15)

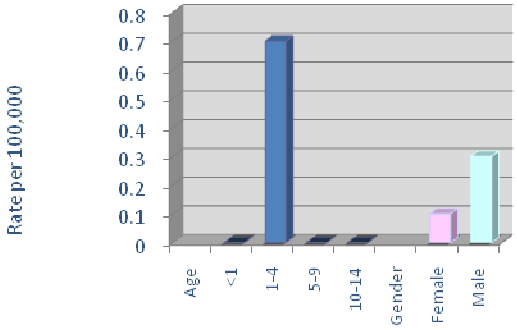


Figure 26: N.C. Unintentional Childhood Pedestrian Related Hospitalizations by Age and Gender, Age 0-14: 2004-2007. (n=88)

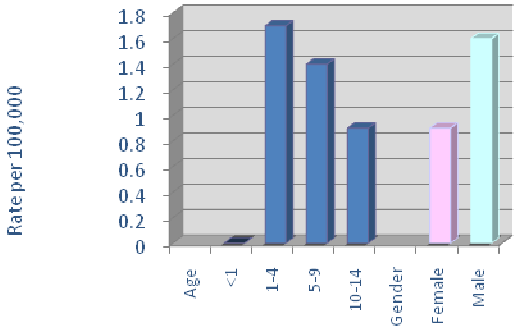
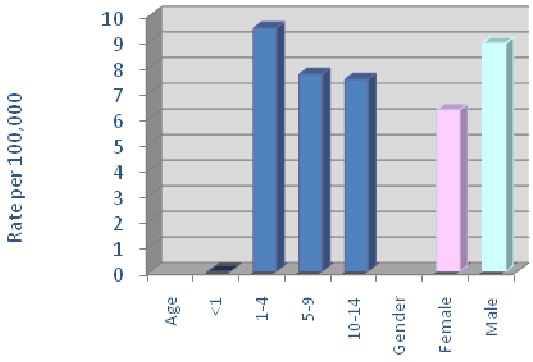


Figure 27: N.C. Unintentional Childhood Pedestrian Related Emergency Department Visits by Age and Gender, Age 0-14: 2006-2007. (n=277)



POISONINGS

From 2004 to 2007, 11 children ages 14 and under died as a result of unintentional poisonings (0.2 per 100,000). During this same time period, 834 children were hospitalized as a result of poisoning (11.7 children per 100,000). From 2006 to 2007, 4,463 children visited the ED as a result of poisoning (122.6 children per 100,000). Poisoning injuries from 2004 to 2007 are estimated to have resulted in $7.2 million in hospital charges. (Table 9).

One- to four-year-olds had the highest poisoning death rates followed, by 10- to 14-year-olds (0.3 and 0.2 deaths per 100,000, respectively). The youngest children were most likely to be hospitalized or seen in the ED as a result of poisoning. In fact, children under the age of five were 6.2 times more likely to be hospitalized and 6.5 times to visit the ED as a result of poisoning than their older peers. As with many other injuries, males die, are hospitalized, and visit the ED more frequently than females. The death rate for males (0.2 per 100,000) was 2.2 times higher than for females (0.1 per 100,000). The hospitalization rate for males (12.7 per 100,000) was about 1.2 times higher than for females (10.6 per 100,000). The ED visit rate for males (132.8 per 100,000) was about 1.2 times higher than that for females (112.0 per 100,000). (Figures 28, 29 and 30).

Figure 28: N.C. Unintentional Childhood Poisoning Related Deaths by Age and Gender, Age 0-14: 2004-2007. (n=11)

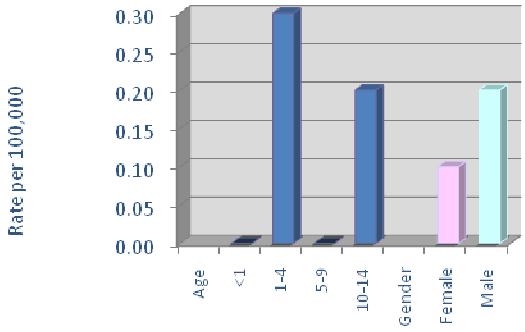


Figure 29: N.C. Unintentional Childhood Poisoning Related Hospitalizations by Age and Gender, Age 0-14: 2004-2007.(n=834)

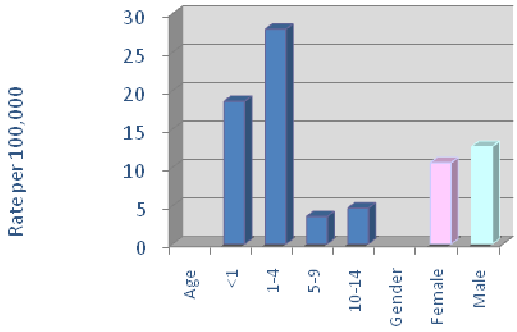


Figure 30: N.C. Unintentional Childhood Poisoning Related Emergency Department Visits by Age and Gender, Age 0-14: 2006-2007. (n=4463)

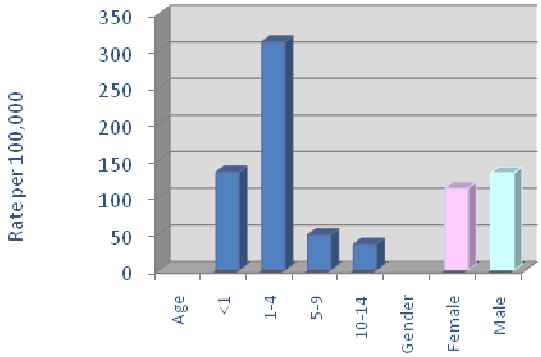


Table 9: Estimated Hospital Charges Resulting from Unintentional Poisoning Injuries among North Carolina Children, Age 0-14: 2004-2007.	
Total Charges:	$7,183,550.21
Median Charge:	$3,620.12
Average (Mean) Charge:	$8,613.37

FALLS

For North Carolina children, unintentional falls are the leading type of injury requiring hospitalizations and ED visits.

From 2004 to 2007, 10 North Carolina children under age 15 died as a result of a fall (0.1 per 100,000) and 2,839 children under 15 were hospitalized (39.7 per 100,000). From 2006 to 2007, 74,454 children under 15 visited the ED (2,045.7 per 100,000). From 2004 to 2007, falls resulted in an estimated $30.1 million in hospital charges. (Table 10).

The hospitalization rate for infants (57.3 per 100,000) was about 1.5 times higher than for any other age group. On the other hand, children ages one to four were more likely to visit the ED due to falling (2,782.2 per 100,000) than were children in any other age group.

Males were more than 1.7 times more likely than females to be hospitalized as a result of falls (49.3 male hospitalizations per 100,000; 29.7 female hospitalizations per 100,000). Males were 1.3 times more likely to visit the ED due to a fall than females (2,309.1 male ED visits per 100,000; 1,769.5 female ED visits per 100,000). (Figures 31, 32 and 33).

Figure 31: N.C. Unintentional Childhood Falls Related Deaths by Age and Gender, Age 0-14: 2004-2007. (n=10)

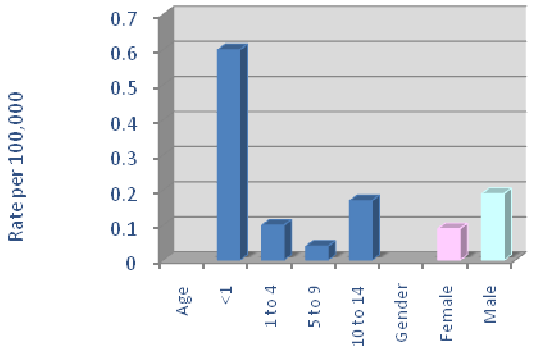


Figure 32: N.C. Unintentional Childhood Falls Related Hospitalizations by Age and Gender, Age 0-14: 2004-2007. (n=2,839)

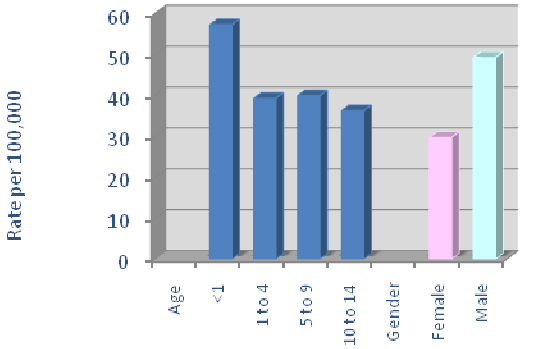


Figure 33: N.C. Unintentional Childhood Falls Related Emergency Department Visits by Age and Gender, Age 0-14: 2006-2007. (n=74,454)

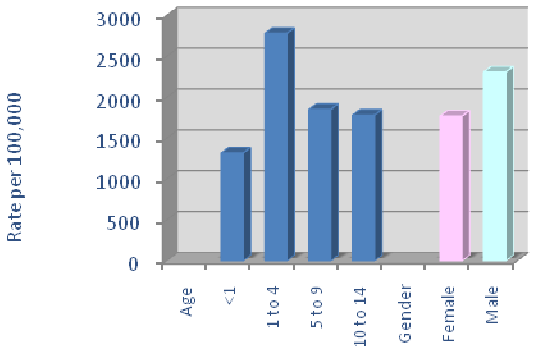


Table 10: Estimated Hospital Charges Resulting from Unintentional Falls Injuries among North Carolina Children, Age 0-14: 2004-2007.	
Total Charges:	$30,141,951.00
Median Charge:	$8,185.17
Average (Mean) Charge:	$10,617.10

Conclusions and Recommendations

- Injury is a major public health problem for children in North Carolina, responsible for an unacceptably high number of deaths and disabilities. Aside from the human toll, the economic impact is considerable.
- The death rates due to unintentional injuries in North Carolina have historically been higher than the nation as a whole for children under the age of 15.
- Unintentional motor vehicle-related injuries continue to be the leading cause of death and the second leading cause of hospitalizations for children. The age group most affected by this type of injury was 10-14. Prevention efforts should continue to emphasize motor vehicle and driving safety. Motor vehicle injuries may be prevented by increasing the availability of child safety seats, enforcing speed limits, strengthening laws prohibiting driving while intoxicated or distracted, and enforcing seat belt and child safety seat laws for vehicle occupants.
- Unintentional suffocation is the second leading cause of death to North Carolina children under the age of 15. Suffocation primarily affects children under 1, accounting for 82% of those deaths. Many suffocation injuries can be prevented by improved product design and education campaigns for parents and caregivers about cribs and toy safety.
- Drowning was the fourth leading cause of death in North Carolina children, affecting mostly children ages one to four. Prevention efforts should be focused on this age group. Drowning prevention strategies may include enforcing regulations requiring life jackets for children on boats and pool fencing and barrier laws; swimming lessons that include open-water instruction; caregiver supervision; and the use of certified lifeguards in public swimming areas. Education and awareness programs for children and adults can also reduce drowning deaths.
- The leading cause of hospitalization and emergency department visits due to unintentional injuries in children 0-14 in North Carolina is falls. In the Childhood Injury report for 1999-2002, the same ranking was observed. Fall injuries may be prevented by using stationary activity centers for infants; having safety gates at the top and bottom of stairs in homes where young children are present; installing window guards; and having playgrounds meet safety guidelines. In addition, better supervision on the part of parents and caregivers could help prevent falls among children.
- The most expensive unintentional injuries in North Carolina were those resulting from firearms, for which the median hospital charge in 2004-2007 was $21,414, followed by motor vehicle injuries ($17,171) and pedestrian injuries ($14,262). Poisonings generated the lowest median charge of $3,620.
- Resources need to be allocated and prioritized according to the impact on individuals and communities, as well as economic costs.
- Increasing attention on policy change and enforcement of existing laws could reduce North Carolina's childhood death rates from unintentional injury. Further, implementation of evidence-based prevention programs and expansion of current programs is called for to address the unacceptably high number of child deaths in the state. The perennial barrier of insufficient funding is an issue that all injury prevention advocates should work to improve but at the same time continuing to do what is possible with current resources.
- The vast majority of injuries are preventable.

APPENDIX A: DATA SOURCES AND TECHNICAL NOTES

Population Estimates

The North Carolina State Center for Health Statistics (SCHS) provided population data for the years 2004-2007. SCHS obtains the population data from the CDC National Center for Health Statistics bridged population file (2007 version).

Death Data

SCHS provided death certificate data for every death in North Carolina. Only North Carolina residents with a North Carolina county address and valid age (0-14) were considered in our analyses. Primary cause of death was assigned with the International Classification, 10th Revision; Clinical Modification (ICD-10) codes. Injuries were then classified into manner and mechanism using CDC's standard injury matrix framework. The CDC Injury Matrix categories might differ slightly from coding used in past reports.

Hospital Discharge Data

The SCHS provided hospital discharge data for every hospital discharge of North Carolina residents with a valid age (0-14). A hospital discharge occurs when a patient leaves a hospital following admission. These data do not represent the number of patients, but the number of discharges (multiple discharges per patient are possible). Cause of injury was assigned by hospital coders using International Classification, 9th Revision; Clinical Modification (ICD-9-CM) External Causes of Injury codes (E Codes). Injuries were then classified into manner and mechanism using CDC's standard injury matrix framework. The CDC Injury Matrix categories might differ slightly from coding used in past reports.

Emergency Department Data

The North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT) is a statewide system. NC DETECT receives data on at least a daily basis from hospital emergency departments (EDs) statewide to provide early event detection and timely public health surveillance to public health officials and hospital users. In 2007, NC DETECT was receiving data daily from 108 of the 112 24/7 EDs in North Carolina. In 2006, NC DETECT was receiving data daily from 89 of the 112 24/7 EDs in North Carolina. Therefore, data for these years are not representative of all EDs in the state, although the majority were reporting. The North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT) provided ED data for North Carolina residents with a valid age (0-14). The ED data, death data, and the hospital discharge data are not mutually exclusive. Cause of injury was assigned by hospital coders using International Classification, 9th Revision; Clinical Modification (ICD-9-CM) External Causes of Injury codes (E Codes). Injuries were then classified into manner and mechanism using the CDC's standard injury matrix framework.

Unintentional Motor Vehicle, Traffic (MVT)

Deaths, hospitalizations and Emergency Department visits resulting from Motor Vehicle Traffic (MVT) injuries refer to injuries from incidents that involve automobiles, trucks, vans, motorcycles, and motorized cycles that are traveling on public roadways. This definition is beyond being merely an occupant in the car. Cause of death codes: V30-V79 (.4-.9), V83-V86 (.0-.3), V20-V28 (.3-.9), V29 (.4-.9), V12-V14 (.3-.9), V19 (.4-.6), V02-V04 (.1, .9) V09.2, V80 (.3-.5), V81.1, V82.1, V87 (.0-.8), V89.2. Hospital and ED E-codes: E810-E819 (.0-.9)

Unintentional Suffocation or Choking

Deaths, hospitalizations and ED visits resulting from choking and suffocation refer to mechanical causes (e.g., plastic bags, refrigerator entrapment, or fallen earth); pressure on the trachea (e.g., drapery cords, clothing drawstrings); and inhalation of food or foreign bodies. Fatal choking in young children typically involves not only round food products such as candies, nuts, grapes and hot dogs, but also non-food products such as undersized pacifiers, small toys, and latex balloons. Cause of death codes: W75-W84. Hospital and ED E-codes: E911-E913.9

Unintentional Fire or Burn Related Injuries

Fire injuries include exposure to flames resulting in injury. Burn injuries include injuries resulting from hot substances such as water, grease, and heating elements and other hot surfaces. In general the majority of burn-related hospitalizations are scalds. Cause of death codes: X00-X19. Hospital and ED E-codes: E890.0-E899, E924.0-.9

Unintentional Drowning or Near Drowning

Drowning and near-drowning injuries refer to those injuries caused by suffocation or near-suffocation as a result of submersion in water. If the victim survives the suffocation, severe neurological injuries may result. Drowning and near-drowning primarily occur in three environments: pools, bathtubs and naturally occurring bodies of water such as streams, lakes, and waters along the North Carolina coast. Cause of death codes: W65-W74. Hospital and ED E-codes: E830.0-.9, E832.0-.9, E910.0-.9.

Unintentional Pedestrian Injuries (non-motor vehicle related)

Deaths, hospitalizations and ED Visits resulting from pedestrian-related injuries are coded in two different categories: as a subcategory under motor vehicle traffic collision (meaning the injury resulted from a collision with a motor vehicle on a public highway) or through a category labeled “Pedestrian, Other”. A “Pedestrian, Other” injury involves a pedestrian injured in a collision with a railway vehicle, a motor vehicle not on a public highway, or other road vehicle (e.g., bicycle, animal being ridden,

streetcar, non-motorized vehicle of object in motion). "Pedestrian, other" injuries are reported in this document. Cause of death codes: V01, V02-V04 (.0), V05, V06, V09 (.0, .1, .3, .9). Hospital and ED E-codes: E800-807(.2), E820-E825 (.7), E826-E829 (.0)

Unintentional Poisonings

Poisoning deaths and hospitalizations refer to injuries resulting from unintentional ingestion of harmful drugs, medicines, gases, household products, solvents, chemicals, acids, and poisonous foods or plants. Cause of death codes: X40-X49. Hospital and ED E-codes: E850.0-E869.9

Unintentional Falls

Unintentional falls result from stairs or ladders, from buildings, into holes, from one level to another, or on the same level from tripping, stumbling or collisions. Fall-related injury is the leading cause for hospitalizations and emergency department visits in North Carolina children. Cause of death codes: W00-W19. Hospital and ED E-codes: E880.0-E886.9, E888.

Methods

In order to explore the extent of the current childhood unintentional injury problem in North Carolina, two approaches were taken: (a) a quantitative analysis of mortality, hospital discharge data and emergency department visits to determine injury rates; and (b) a quantitative description of hospital charges for specific unintentional injuries.

Injury Rate Calculations

Mortality, hospitalization and ED visit rates were calculated based on the North Carolina death, hospitalization and ED visit files for 2004-2007, obtained from the SCHS and NC DETECT. The processes for calculating the mortality, hospitalization and ED visit rates for North Carolina childhood injuries were similar. First, records with a primary diagnosis other than injury were excluded. Next, E-codes using CDC's injury matrix standard definitions were used to create injury groups (MVT, drowning, etc) based on the CDC Injury Matrices that are suitable for describing the external causes of injuries. Denominators for rate calculations were based upon 2004-2007 age group population numbers from the SCHS for deaths and hospitalizations and upon 2006-2007 populations numbers for ED visits and are expressed "per 100,000 persons" unless otherwise noted.

Hospital Charges Calculations

Hospital charge totals were calculated by summing the charges across all cases within each injury group (Injury Overall, MVT, Poison, etc). It is important to note that hospital charges reflect only a part of the cost of injuries. Physician charges, emergency vehicle services, out-patient drug charges, medical equipment and time lost from work by parents or school by children have not been included in this report. All charges are reported in that year's dollars and have not been adjusted for inflation. Hospital charges also reflect specific pricing agreements that hospitals have with insurance companies.

Other E-codes used in analysis:

Additional injury coding was used to categorize differing types of unintentional injuries. These codes are based on the CDC Injury Matrix Framework:
Deaths/Mortality: www.cdc.gov/nchs/data/ice/icd10_transcode.pdf.
Hospitalization Discharge and Emergency Department Visits Nonfatal:
www.cdc.gov/ncipc/osp/matrix2.htm.

Appendix B: Injury Prevention Resources

National Center for Injury Prevention and Control (NCIPC)
(Centers for Disease Control and Prevention)
Mailstop F63
4770 Buford Highway NE
Atlanta, GA 30341-3717
Phone: 800-CDC-INFO/ (800-232-4636)
TTY: (888) 232-6348
24 Hours/Every Day
www.cdc.gov/injury
Email: cdcinfo@cdc.gov
Acting Director: Louise Galaska, MPA

Injury and Violence Prevention Branch
Chronic Disease and Injury Section, NC Division of Public Health
Department of Health and Human Services
1915 Mail Service Center
Raleigh, NC 27699-1915
Phone: (919) 707-5425
Email: beinjuryfreenc@dhhs.nc.gov
www.injuryfreenc.ncdhhs.gov
Chief, Chronic Disease and Injury Section: Ruth Petersen, MD
Interim Head, Injury and Violence Prevention Branch: Chris Bryant, M.Ed

North Carolina Safe Kids Coalition
North Carolina Department of Insurance
Office of Safety & Fire Marshall
1202 Mail Service Center
Raleigh, NC 27699-1202
Phone: (919) 733-3901
www.ncdoi.com/OSFM/ProgramsPreventionAndGrants/SafeKidsMessage.asp
Chairman: Wayne Goodwin
Deputy Director: Kelly Ransdell

CDC Centers of Excellence
UNC Injury Prevention Research Center
University of North Carolina
Bank of America Building, Suite 500
137 East Franklin Street, CB#7505
Chapel Hill, NC 27599-7505
Phone: (919) 966-2251; Fax: (919) 966-0466
www.iprc.unc.edu
Director: Carol Runyan, MPH, PhD
Associate Director: Andres Villaveces, MD, PhD

Children's Safety Network: National Injury and Violence Prevention Resource Center
Education Development Center, Inc.
55 Chapel Street
Newton, MA 02458-1060
Phone: (617) 618-2918
www.childrenssafetynetwork.org
Director: Sally Fogerty, BSN, MEd

Safe Kids Worldwide
1301 Pennsylvania Ave, NW, Suite 1000
Washington, D.C., 20004-1707
Phone: (202) 662-0600; Fax: (202) 393-2072
www.safekids.org
Director: Martin R. Eichelberger, MD

REFERENCES

1. Margolis L., 2005. Injuries to North Carolina Children and the Role of SAFE KIDS. University of North Carolina Injury Prevention Research Center.

2. Nagesh, N. B., 2008. CDC Childhood Injury Report: Patterns of Unintentional Injuries among 0-19 Year Olds in the United States, 2000 – 2006. U. S. Department of Health and Human Services Centers for Disease Control and Prevention; National Center for Injury Prevention and Control; Division of Unintentional Injury Prevention. Atlanta, GA. December 2008. Retrieved September 5, 2009 from: www.cdc.gov/SafeChild/ChildhoodInjuryReport/index.html

3. Sabel, J. 2004. Washington State Childhood Injury Report. Washington State Department of Health, Injury Prevention Program.